

August 2003

By Elizabeth Sellers, Manager, U.S. Department of Energy NE-Idaho Operations Office

INEEL's Role in the Nation's Nuclear Energy Future

In the United States and in countries around the world, leading economists, national leaders and scholars are increasingly voicing this realization – that safe, affordable energy is an essential component of worldwide economic prosperity. It is impossible to ignore the fact that in regions of the world where energy supplies are expensive, scarce or non-existent, peace and prosperity also tend to be threatened, scarce or non-existent.

Energy security is an essential part of national security and global harmony.

The Administration's Energy Policy calls for continued use of fossil energy, while promoting expansion of renewable energy sources and conservation. It also calls for expansion of modern nuclear energy.

That's where INEEL's capabilities enter the picture.

Last year, Secretary Abraham announced plans to return the Idaho complex to its historic mission of nuclear technology development in order to support the nation's expanding nuclear energy initiatives. Since then, DOE has been engaged in comprehensive planning for the site's future.

These plans place the Idaho lab at the center of DOE's work:

- **Developing advanced Generation IV nuclear energy systems.**
- **Developing nuclear energy/hydrogen co-production technology.**
- **Developing advanced nuclear energy fuel cycle technologies.**
- **Providing national security answers to national infrastructure needs.**

The INEEL strategic vision is for this lab to emerge as the leading contributor to our nation's energy security and environmental quality -- by developing advanced, sustainable, safe and economical nuclear energy and nuclear fuel cycle technologies.

Researchers from 10 nations including the U.S. (the Gen IV International Forum) are working cooperatively on Generation IV nuclear power reactor designs. During the past two years, INEEL exercised strong leadership in the development of the forum's Gen IV research and development roadmap.

These international researchers envision that Gen IV reactors will be environmentally friendly, economical, proliferation-resistant, have enhanced safety, and will produce no greenhouse gases and far less waste. Hydrogen co-production capability is another desirable feature of some Gen IV reactors.

Gen IV technologies being studied at the INEEL include very high temperature gas reactors, helium gas-cooled fast reactors, and supercritical water-cooled reactors.

Funding that supporters in Congress are pressing this year to have reinserted into the Energy Bill now on its way to conference would authorize the Energy Secretary to establish an Advanced

Reactor Hydrogen Co-Generation Project in Idaho. While this is a congressional initiative, rather than a DOE initiative, DOE supports it and INEEL is ready and able to perform this work.

- Its scope includes R&D, design, construction, operations and demonstration.
- It names INEEL lead lab for the project and the preferred site.
- It requires U.S. industry, university and lab participation, and encourages international collaboration.

During the first week of August 2003, when DOE's Nuclear Energy, Science & Technology Director Bill Magwood visited Idaho, he reaffirmed DOE's goal to make the INEEL the national center for nuclear energy research and development.

Whether or not the Energy Bill that Congress passes contains all funding to establish the Advanced Hydrogen Co-Generation Project, Director Magwood said DOE still intends to devote funds so that INEEL will become a major contributor toward development of Generation IV reactors. – As noted above, these are the next generation of energy production reactors that have enhanced safety and are affordable, proliferation-resistant, don't produce greenhouse gases and result in minimal waste. He stated the site would have the lead in the near- and long-term missions to develop Generation IV nuclear reactor energy technologies.

Near-term, DOE is exploring construction and demonstration of the Next Generation Nuclear Plant (NGNP). This is a very high temperature reactor to demonstrate technology for electricity and hydrogen co-production by 2020. DOE considers the NGNP the nearest-term Gen IV reactor, and it is also considered to be the reactor that will meet the intent of the Congressional Advanced Reactor Hydrogen Co-Generation Project discussed earlier. The long-term goal is to build and demonstrate an advanced fast reactor, possibly by 2040. Fast reactors operate at higher neutron energy levels. This results in more complete utilization of the fuel, resulting in less waste.

INEEL's role in the NGNP would be to lead development of technology for the reactor and its fuel cycle, lead technical coordination with other laboratories and international partners, assist the Nuclear Regulatory Commission in developing the regulatory process for the next generation of reactor and have the regulatory process ready when the demonstration reactor is done, site and construct the demonstration reactor, and develop an advanced fuel cycle.

The long-term phase would be to demonstrate a gas-cooled or lead-cooled fast reactor and advanced fuel cycle. This technology, and its ability to manage wastes, could play a role in a decision of whether a second high-level waste repository is needed.

Director Magwood noted that in Congress today, nuclear energy technology is closer to a consensus of support than it was 10 years ago. He said that an administration change wouldn't necessarily stop the nuclear energy mission. But it is important that progress be made quickly so we can demonstrate the value of the technology if a new administration does come in.

Here are some other points Director Magwood made:

- The INEEL needs to build some areas of its technical expertise. By DOE getting out the message of its plans for the laboratory, officials hope to convince scientists and engineers in the nuclear arena that the INEEL is the place to be to pursue this work.
- Other DOE labs have some of the capabilities now needed for the nuclear technology mission, and the INEEL must work with them. This lab will be the hub of the wheel that performs the R&D in the national lab arena. As the INEEL starts down the path of

demonstrating the new reactor technology, it will attract more expertise here to carry out the mission.

- The INEEL still must continue to be strong in its multi-program capabilities in national security, and science and technology to support DOE missions.
- The INEEL needs to build its high-speed computer capabilities to support the nuclear mission.
- DOE and the INEEL must reach out early to surrounding communities and talk to them about our new mission and the demonstration reactor that would be built here. We need to assure them they will be kept informed, their issues addressed and the environment protected.

I'm sure you've heard about the DOE's decision to split future operation of the site into separate contracts – one for cleanup activities and one for laboratory missions. This is being done to best focus on these two distinct missions – to finish the cleanup and to move the lab into the future in ways that best serve national priorities regarding energy security and national security.

There will be two separate solicitations – one for the new laboratory contract and one for the accelerated cleanup contract.

We anticipate that the Nuclear Energy, Science and Technology contract will be focused on running a multi-program national laboratory with emphasis on nuclear energy technology and national security. Argonne National Laboratory-West's program will be fully integrated into the new laboratory. We expect to develop a far more effective nuclear energy research and development effort by bringing the best capabilities of Argonne-West and the INEEL together. We also expect to realize economies of scale in operations and management. This lab will be called the Idaho National Laboratory.

We anticipate that the Environmental Management contract will focus on providing significant incentives to the successful contractor to accomplish the goals outlined in the INEEL Performance Management Plan for Accelerated Cleanup.

Each of the procurements is separate and unique with its own separate schedule driven by the requirements that the solicitation places on the bidders. But we do expect these separate solicitations to be issued at about the same time. We expect to do this by this autumn.

The DOE's Source Evaluation Board will score the proposals and the DOE Source Selection Officials will make the final selections.

Our detailed scope of the new laboratory contract is in development. As currently envisioned, the lab will be composed of the current Idaho National Engineering and Environmental Laboratory and Argonne National Laboratory-West, and its tasks will include:

- Assembling the capabilities to deliver the research and advance the design for a prototype Generation IV nuclear energy system.
- Establishing a strong science and technology leadership team that will partner with the Department to pursue its nuclear energy technology and energy security vision for the laboratory.
- Integrating Idaho's current nuclear energy capabilities under a single, future-focused, management structure.

The lab also will continue supporting the nation's national security needs, with programs such as the Critical Infrastructure Assurance program, in which technologies, systems and policies that protect the nation's infrastructure systems - such as energy, communications, and transportation - are developed, tested and validated under real-world conditions. One facet of the Critical Infrastructure Assurance program already operating on the site is the Wireless Test Bed, which offers large-scale, independent, end-to-end testing of wired and wireless next generation communication infrastructure including 3G/4G cellular, land mobile radios and wireless local area network systems. The Test Bed opened for business April 1 and engineers are now conducting tests for a major carrier.

Cleanup at INEEL remains a high priority and is being accelerated. Along with saving money, our key goals with accelerated cleanup are risk reduction and continued protection of the Snake River Plain Aquifer.

The accelerated cleanup goals are focused on reducing the greatest potential risks to human health and the environment, with cleanup decisions based on sound scientific and technical decisions.

- Treat sodium-bearing waste, package it and ship it out of Idaho by 2012 instead of just treating it by 2015.
- Close the high-level waste tank farm tanks by 2012.
- Clean up contaminated tank farm soils by 2020 instead of 2024.
- Ship high-level waste calcine out of Idaho by 2035 instead of 2070.
- Transfer spent nuclear fuel from wet storage to dry storage by 2012 instead of 2023.
- Ship all spent nuclear fuel out of Idaho by 2035.
- Ship 65,000 cubic meters of waste stored at the Transuranic Storage Area out of Idaho by 2012 instead of 2018.

The world's lack of safe, clean, abundant, affordable energy really is a problem. Nuclear energy is part of the solution.

Because we in the United State and in Idaho in particular have the expertise to help solve this problem, it is our duty to tackle this problem.

To not tackle the energy problem when we have the ability to do so would be irresponsible.

DOE's strategy of advancing nuclear energy with Idaho taking the lead role is one sensible, essential way to help tackle the energy problem.

As we tackle the energy problem by advancing nuclear energy technology, we will continue to listen to the public's concerns.

And we will continue to care about the public's concerns that we do our work safely and with great respect for the environment.

